SECTION 5

CLEANUP STANDARDS

5.1 BACKGROUND

5.1.1 MTCA (WAC 173-340) indicates that cleanup standards be identified for hazardous substances at a site and for the specific interaction pathways, such as soil or groundwater, where humans and the environment can become exposed to these substances. The regulation provides uniform methods for identifying cleanup standards and requires that all cleanups performed under the MTCA meet these standards. The actual degree of cleanup may vary from site to site and is determined by the cleanup action alternative selected during the feasibility study. Establishing cleanup standards for individual sites requires the specification of the following:

- Hazardous substance concentrations that protect human health and the environment ("cleanup levels");
- The location on the site where those cleanup levels must be attained ("points of compliance"); and
- Additional regulatory requirements that apply to a cleanup action because of the type of action and/or the location of the site (applicable state and federal laws).

5.1.2 MTCA (WAC 173-340-200) defines “permanent cleanup action” as an action in which the cleanup standards are met without further action being required at a site. At sites where a “permanent cleanup action” is not practicable, “remediation levels” may be selected using a disproportionate cost analysis. MTCA (WAC 173-340-200) defines “remediation levels” as a concentration (or other method of identification) above which a particular cleanup action component will be required as part of a cleanup action at a site. Remediation levels are not the same as “cleanup levels”. A “cleanup level” defines the concentration above which a medium must be remediated. Remediation levels, by definition, exceed cleanup levels. Sites using remediation levels should also use institutional controls to assure continued protection of human health and the environment and to prevent land uses that could result in a higher level of exposure (WAC 173-34-440).

5.1.3 The methodology in MTCA for establishing cleanup levels involves identification of the nature and extent of contamination, evaluation of exposure pathways, current and potential receptors, and current and potential land use. Based on this information one of three methods (MTCA Method A, B, or C) is then used to calculate cleanup levels. MTCA Method A uses published tables to determine the cleanup action level for sites

undergoing routine cleanup with relatively few hazardous substances. MTCA Method B uses risk assessment equations to determine the cleanup action level at sites contaminated with hazardous substances not listed under MTCA Method A. MTCA Method C uses less stringent exposure assumptions than Method B and is used when attainment of Method A or Method B cleanup levels are not possible or would result in a significantly greater overall threat to human health and the environment.

5.1.4 MTCA does not identify a cleanup level for MEC; nor does MTCA identify exposure factors for MEC that could be used to develop a site-specific cleanup level. The MTCA methods which were developed for chemical contaminants are not applicable for establishing cleanup levels for MEC. Furthermore, the State of Washington presently has no quantitative legal standards governing cleanup of MEC. However, the State of Washington has determined that MEC is within the statutory definitions of "hazardous waste" and must be managed and cleaned up as required for such materials in accordance with MTCA (WAC 173-340).

5.2 DEVELOPMENT OF CLEANUP STANDARDS TO CAMP BONNEVILLE

5.2.1 The intent of MTCA is to select cleanup standards that are protective of human health and the environment. Proposed site-specific cleanup standards (remediation levels and points of compliance) to address the explosive safety risk posed by different site types located within Camp Bonneville are presented based on the baseline explosive safety exposure assessment, described in Section 4. Specifically, the remediation level and points of compliance are defined to ensure protection of the human health and the environment and to be consistent with the planned future land use.

5.2.2 MTCA (WAC 173-340-7490) requires that the impact of hazardous substances on terrestrial ecological receptors be considered in the establishment of cleanup standards. Although an animal may come into direct contact with an OE item located on the ground surface, they are not likely, except in the rarest of circumstances, to act on it in a forceable manner to initiate an unintentional detonation. Unlike chemical hazardous substances, MEC does not pose an appreciable threat to soil biota, plants or animals. Therefore ecological receptors are not considered further in development of the cleanup standards at Camp Bonneville.

5.2.3 MEC clearance actions will reduce the concentration of MEC and the resulting explosive safety threat to the public. The depth to which MEC clearance is required depends upon a number of factors, including: the future use of the site; the estimated intrusion into the soil associated with likely future activities; and, consideration of natural processes that might increase the future potential for receptor interaction (i.e. frost heave, erosion).

5.2.4 Over time, recurring natural processes such as flooding and frost heave can displace MEC located on or beneath the ground surface, making it more accessible for human interaction. There are no MEC source areas that overlie Lacamas Creek other than the Range Safety Fans and Maneuver Areas. As such, the potential for increased MEC exposure from erosion along Lacamas Creek is not considered to be an important

factor for increased human exposures due to the lack of significant MEC source areas overlying Lacamas Creek (with low to remote likelihood of muniton contamination). Therefore, erosion along Lacamas Creek is not considered in the development of the Camp Bonneville cleanup standards.

5.2.5 Consideration of the effects of frost heave on the determination of clearance depths ensures that the response action will be effective. Frost heave is the movement of soils during a freeze-thaw cycle. When water freezes, it expands and creates uplift pressure. Silt and clay rich soils are more susceptible to frost heave than granular (sandy) soils and vegetation reduces the effects of frost heave. Althought the majority of Camp Bonneville is heavily vegetated, over time, MEC buried above the frost line may migrate upwards through frost heave action. The frost penetration depth at Camp Bonneville is approximately 14 inches (USACE, 2000).

5.2.6 Complete excavation to depth and restoration of the entire Camp Bonneville to allow unrestricted use is impracticable due to its inordinately high costs, its excessive time-frame to accomplish excavation, the resulting near-total ecological destruction and the decades-long time frame for environmental restoration. Additionally, this extreme measure is not necessary to ensure public safety. The MEC risk assessment identified a qualitative level of exposure hazard posed by each site type that is based on realistic assumptions and supported by actual data regarding the MEC source and receptor interaction. The level of exposure hazard varied for each of the site types and therefore each site type poses different opportunities for employing risk management strategies.

5.2.7 Eliminating all risk at Camp Bonneville is not practicable, even after MEC cleanup is complete. Since exposure to MEC is assumed to result in some level of explosive safety risk, “a clean MEC site ” generally means that a site is cleaned up to a point that the likelihood for MEC source and receptor interaction is negligible. The remediation level proposed for Camp Bonneville is the condition where “the likelihood for MEC source and receptor interaction is negligible”. The points of compliance will be based on those areas (measured in both horizontal and vertical dimensions) where the MEC source and receptor interactions are likely to occur. MEC clearance actions will be limited to the footprint of those specific areas that allow an MEC source and receptor interaction to occur, as only those specific areas pose an unacceptable MEC exposure hazard.

5.2.8 The Firing Points, OB/OD Areas, and Target Areas at Camp Bonneville were determined in the MEC risk assessment to pose an unacceptable MEC exposure hazard. These site types will be evaluated for a range of risk management strategies in the feasibility study that will result in a condition where the likelihood for MEC source and receptor interaction is negligible. The actual depth of clearance for these areas will be determined during the evaluation of cleanup action alternatives in the feasibility study by consideration of the MEC source and receptor interactions.